Intermediate Temperature Proton Conductors – Why and How

Li, Qingfeng; Aili, David; Jensen, Jens Oluf; Cleemann, Lars Nilausen

Publication date:
2016

Document Version
Peer reviewed version

Intermediate Temperature Proton Conductors – Why and How

Qingfeng Li, David Aili, Jens Oluf Jensen, and Lars N. Cleemann

Section of Proton Conductors
Department of Energy Conversion and Storage
Technical University of Denmark
Kemitorvet 207, DK-2800 Lyngby, Denmark
qfli@dtu.dk

The current technologies of fuel cells and electrolzers are based on ionic conducting electrolyte materials exclusively operational either in the low (20 - 200ºC) or high (600 - 1000ºC) temperature ranges. The intermediate temperature window, especially between 200 and 400 ºC, is still only represented by early fundamental material research for ionic electrolytes. Such materials, most likely based on proton conductors, are expected to bring a new generation of the technologies: fuel cells by direct oxidation or internal splitting of biofuels such as methanol and ethanol, as well as efficient water electrolyzer, preferrably a CO_2 co-electrolyzer for generation of organic liquid fuels. Such technologies are of essential simplicity and allow for kinetic enhancement so that the need for precious metal catalysts as in low temperature systems might be eliminated. At the same time, this temperature range is low enough to have a wide selection of materials for cell and stack construction, and with potential long-term durability. This talk will briefly outline the recent work at DTU based on acid-base complexes and metal phosphates.